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TOPPING COTTON TO PREVENT LODGING AND IMPROVE MECHANICAL HARVESTING^{1/}

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Topping cotton is the practice of cutting off the terminal bud of the main stalk to prevent further growth. Cotton is topped to reduce its tendency to lodge (fall over) which often occurs with tall rank-growing plants (fig. 1). Lodged cotton is difficult to defoliate and to harvest, either by machine or hand labor. Lodging also results in conditions more favorable for boll rot.

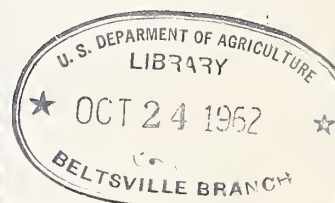


Figure 1. A field of lodged cotton. The cotton on the left shows the actual height when held erect.

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Topping can be done either by hand or by machine. Only the terminal bud of the main stalk is removed in hand topping. In machine topping, all the lateral branches above the height of the topper blade are also cut off. Various types of topping machines have been built, but the type shown in figure 2 is the most common. It consists of four horizontally revolving blades (one blade to a row) mounted under a frame on the front of a high clearance tractor.



Figure 2. A mechanical cotton topper. There are four horizontally revolving blades under the frame on the front.

From 1951 through 1960, a total of 15 experiments were conducted to determine the effect of machine topping at various heights, and of hand topping, on lodging, yield, mechanical picking efficiency, and seed cotton trash and lint grade. The experiments were conducted at the U. S. Cotton Experiment Station at Shafter, Calif., and on selected farms in that locality. The cotton was planted in April and harvested in October or early November. The time of topping varied from as early as July 22 to as late as August 26, but most years was the first week in August. The height of the plants at the time of topping varied from about 3 1/2 to over 5 feet. In some tests, plant height was fairly uniform, whereas in others, it varied considerably in different parts of the individual plots. In some years, there was no lodging in the check or untopped plots, but in others, as much as 75 percent of the untopped cotton lodged. In some tests, mechanical topping was done with fixed settings of the topper blade at heights of 42, 48, and 52 inches.

In other tests the topper setting was adjusted so that from 4 to 6 inches was cut off regardless of plant height. All test plots were randomized and replicated. The results of the experiments are given in the table on page 4.

Yield. Yields varied in the different tests and treatments depending on the time of topping, the height of the cotton when topped, and the amount of lodging in the check plots. Yield was reduced in the plots topped at 42 inches. This reduction was statistically significant in only one test, but the trend was evident in four out of six tests. Reduced yields appeared to occur in the plots topped relatively late in the season. There was no difference in the average yield between the check plots and those topped at 48 and 52 inches. In the several tests at these heights, there was one significant increase in yield from a midseason topping (August 3), and one reduction in yield from a late topping (August 16). Hand topping had a tendency to increase yield, but this trend was significant in only two tests and the average increase was slight. Variable topping (cutting off only 4 to 6 inches) had no effect on yield. Since topping at 42 inches usually removed more than 6 inches of the plant and reduced yield, removing more than 6 inches would not be advisable under most conditions.

Picking Efficiency. Efficiency of mechanical harvesting was a function of the degree of lodging rather than the kind or height of topping. When there was lodging in the check plots, picking efficiency was always lower than in the topped plots, but the difference was statistically significant in only one test. With severe lodging, the difference was as much as 3.5 percent.

Seed Cotton Trash and Lint Grades. There was little difference between the check and topped cotton in seed-cotton trash and lint grades. When lodging occurred, there was some tendency for the trash percentage to be higher and the grade lower.

Lodging. Lodging in the check cotton varied in the different tests from none to as much as 75 percent. There was no lodging in any of the cotton topped at 42 inches nor in that topped at variable heights. In the cotton topped at 48 inches there was lodging in only one test out of nine. This occurred in only one of the four replicates in that test. In two tests with machine topping at 52 inches, and in two with hand topping, as much as 25 percent of lodging occurred.

CONCLUSIONS

Topping cotton eliminated or greatly reduced lodging. Yield was not reduced by mechanical topping when not more than about 6 inches of the main stalk was removed. Topping to a height of about 48 inches gave the best results in these tests on the basis of lodging, yield, and picking efficiency. Cotton should be topped when not more than 6 inches of the main stalk would be cut off.

EFFECT OF MECHANICAL TOPPING AT VARIOUS HEIGHTS
AND OF HAND TOPPING ON COTTON PRODUCTION AND MECHANICAL HARVESTING

Year	Date of topping	Yield, Bales per acre		Picking efficiency percent		Seed cotton trash, percent		Grade index		Lodging percent	
		Check	Top. 42"	Check	Top. 42"	Check	Top. 42"	Check	Top. 42"	Check	Top. 42"
1954	July 15	2.68	2.85	88.6	91.9	9.3	8.3	96	97	75	0
1958	July 31	2.86	2.69	--	--	--	--	--	--	75	0
1953	Aug. 3	2.22	2.32	93.7	94.1	5.4	6.4	101	102	25	0
1954	Aug. 4	2.74	2.53	91.4	94.9	5.7	5.0	94	97	65	0
1952	Aug. 8	3.19	3.00	95.0	94.7	7.7	9.0	98	96	0	0
1955	Aug. 16	2.82	2.24**	95.8	96.2	--	--	95	96	15	0
Average --		2.75	2.61	92.9	94.4	7.0	7.2	97	97	--	--
Year	Date of topping	Top. 48"		Top. 48"		Top. 48"		Top. 48"		Top. 48"	
		Check	Top. 48"	Check	Top. 48"	Check	Top. 48"	Check	Top. 48"	Check	Top. 48"
1954	July 22	2.68	2.71	88.6	90.7	9.3	7.2	96	97	75	0
1958	July 31	2.86	2.80	--	--	--	--	--	--	75	0
1953	Aug. 3	2.04	2.22*	91.0	93.7	8.5	5.9	95	98	50	8
1953	Aug. 3	2.22	2.26	93.7	94.6	5.4	6.4	101	100	25	0
1954	Aug. 4	2.74	2.62	91.4	93.0	5.7	5.6	94	96	65	0
1957	Aug. 5	2.27	2.38	--	--	6.9	6.1	97	97	5	0
1951	Aug. 8	2.33	2.29	92.7	93.3	6.9	7.0	--	--	10	0
1952	Aug. 8	2.94	2.87	92.7	95.5	8.6	7.5	94	94	75	0
1955	Aug. 16	2.82	2.59*	95.8	96.9	--	--	95	98	15	0
Average --		2.54	2.55	92.3	93.9	7.3	6.5	96	97	--	---
Year	Date of topping	Top. 52"		Top. 52"		Top. 52"		Top. 52"		Top. 52"	
		Check	Top. 52"	Check	Top. 52"	Check	Top. 52"	Check	Top. 52"	Check	Top. 52"
1958	July 31	2.86	2.82	--	--	--	--	--	--	75	20
1953	Aug. 3	2.22	2.23	93.7	92.6	5.4	5.4	101	101	25	20
1957	Aug. 5	2.27	2.32	--	--	6.9	6.0	97	94	5	0
1955	Aug. 16	2.82	2.85	95.8	96.7	--	--	95	100	15	0
Average --		2.54	2.55	94.7	94.7	6.1	5.7	98	98	--	--
Year	Date of topping	Hand topped		Hand topped		Hand topped		Hand topped		Hand topped	
		Check	Hand topped	Check	Hand topped	Check	Hand topped	Check	Hand topped	Check	Hand topped
1953	Aug. 3	2.04	2.36**	91.0	93.6	8.5	6.7	95	95	50	25
1954	Aug. 4	2.74	3.04*	91.4	92.7	5.7	6.0	94	98	65	15
1957	Aug. 5	2.27	2.52	--	--	6.9	6.5	97	95	5	0
1956	Aug. 7	2.35	2.43	--	--	--	--	--	--	0	0
1951	Aug. 8	2.33	2.33	92.7	93.3	6.9	7.3	--	--	10	0
1952	Aug. 8	2.94	2.97	92.7	95.5	8.6	8.9	94	96	75	0
1952	Aug. 8	3.19	3.20	95.0	95.0	7.7	9.1	98	98	0	0
1955	Aug. 16	2.82	2.82	95.8	96.7	--	--	95	97	15	0
Average --		2.59	2.68	93.1	94.5	7.4	7.5	96	97	--	--
Year	Date of topping	Variable topping		Variable topping		Variable topping		Variable topping		Variable topping	
		Check	Variable topping	Check	Variable topping	Check	Variable topping	Check	Variable topping	Check	Variable topping
1959	July 17	2.45	2.50	88.2	90.4	10.9	9.2	--	--	75	0
1959	July 27	2.55	2.35	87.7	89.2	10.8	10.0	--	--	75	0
1960	July 28	2.64	2.69	93.7	93.4	8.1	8.0	--	--	0	0
1956	Aug. 7	2.35	2.40	--	--	--	--	--	--	0	0
1955	Aug. 26	2.38	2.33	95.9	96.2	11.0	11.3	95	94	0	0
Average --		2.47	2.45	91.4	92.3	10.2	9.6				

* Significant at 5 percent level between topped and check.

** Significant at 1 percent level between topped and check.